

## CLAIMS

### What is Claimed is:

1. A method for digitally rendering a material using BRDF data, the method comprising:
  - 5 accessing a database of BRDF data, the BRDF data comprising measured BRDF values for a sample material;  
processing the BRDF data to define estimated BRDF values over a regular grid corresponding to light rays, the light rays being of a type selected from incident rays or reflected rays; and
  - 10 recording the estimated BRDF values in a data table for input to a shading algorithm, whereby the shading algorithm is enabled to shade modeled surfaces of the material by interpolating BRDF values for modeled light rays from the estimated BRDF values in the data table corresponding to adjacent light rays, the adjacent light rays being of a type matching the modeled light rays.
- 15 2. The method of Claim 1, wherein the processing step further comprises removing outliers from the BRDF data comprising measured BRDF values, prior to defining the estimated BRDF values.
- 20 3. The method of Claim 1, wherein the processing step further comprises defining the estimated BRDF values over the regular grid of light rays, the light rays being reflected rays.
4. The method of Claim 1, wherein the processing step further comprises defining the estimated BRDF values over the regular grid of light rays, the light rays being incident rays and reflected rays.
- 25 5. The method of Claim 1, wherein the processing step further comprises constructing a NURBS surface from NURBS curves representing measured BRDF values along a defined section of a sampling grid.

6. The method of Claim 5, wherein the processing step further comprises defining the estimated BRDF values for the light rays corresponding to the regular grid from intersections of the light rays with the NURBS surface.

7. The method of Claim 1, further comprising measuring the measured  
5 BRDF values using a reflectometer with an incident light source comprising a laser.

8. The method of Claim 7, wherein the measuring step further comprises emitting an incident beam configured as a beam of substantially constant cross-sectional area.

9. The method of Claim 8, further comprising collecting the measured BRDF  
10 values for the incident beam corresponding to a regular grid of incident beam locations.

10. The method of Claim 1, further comprising shading modeled surfaces of the material by interpolating BRDF values for modeled light rays from the estimated BRDF values in the data table using a fast quadrilinear interpolation.

11. A computer-readable media encoded with instructions for digitally rendering a material using BRDF data, the instructions comprising:

accessing a database of BRDF data, the BRDF data comprising measured BRDF values for a sample material;

5 processing the BRDF data to define estimated BRDF values over a regular grid corresponding to light rays, the light rays being of a type selected from incident rays or reflected rays; and

10 recording the estimated BRDF values in a data table for input to a shading algorithm, whereby the shading algorithm is enabled to shade modeled surfaces of the material by interpolating BRDF values for modeled light rays from the estimated BRDF values in the data table corresponding to adjacent light rays, the adjacent light rays being of a type matching the modeled light rays.

12. The computer-readable media of Claim 1, wherein the instructions for processing further comprise removing outliers from the BRDF data comprising  
15 measured BRDF values, prior to defining the estimated BRDF values.

13. The computer-readable media of Claim 1, wherein the instructions for processing further comprise defining the estimated BRDF values over the regular grid of light rays, the light rays being reflected rays.

14. The computer-readable media of Claim 1, wherein the instructions for  
20 processing further comprise defining the estimated BRDF values over the regular grid of light rays, the light rays being incident rays and reflected rays.

15. The computer-readable media of Claim 1, wherein the instructions for processing further comprise constructing a NURBS surface from NURBS curves representing measured BRDF values along a defined section of a sampling grid.

25 16. The computer-readable media of Claim 15, wherein the instructions for processing further comprise defining the estimated BRDF values for the light rays

corresponding to the regular grid from intersections of the light rays with the NURBS surface.

17. The computer-readable media of Claim 1, wherein the instructions further comprise shading modeled surfaces of the material by interpolating BRDF values for modeled light rays from the estimated BRDF values in the data table using a fast quadrilinear interpolation.